

REMARKS

This is a response to the Office Action dated February 24, 2004 in which applicant received a notice of Non-Response Amendment. In the Office Action of February 24, 2004, the cancellation of claims 1-21 and 32-44 were acknowledged and the newly submitted claims 45-49 were withdrawn from consideration. Applicant now cancels the withdrawn claims 45-49 as well as the withdrawn claims 22-31. Applicant further adds new claims 50-65. Support for the new claims is found in the application as filed and no new matter has been added. The Office Action is discussed below.

New claims 50-65

New claims are directed to the same invention as the invention elected by applicant in applicant's Response (dated 12/20/02) wherein applicant elected Group I: claims 1-21, 32-44. Applicant's election of Group I was in response to Examiner's Election/Restrictions requirement dated 7/23/2002.

Evidence that new claims 50-65 are directed to the same invention as originally elected claims 1-21, 32-44 is presented by comparison of the limitations of the new claims with the originally filed claims and the originally filed specification. See Table below.

TABLE

NEW CLAIMS 50-65	SUPPORT ORIGINAL CLAIMS 1-21,32-44 ORIGINAL SPECIFICATION
new Claim 50	-Claim 17 -Figure 2E shows a second dielectric layer 140 disposed on conductive layer 130a,b within opening 170
new Claim 51	-page 34, lines 20-21 -Figure 6R
new Claim 52	-page 34, lines 20-21 -Figure 6R
new Claim 53	-Claim 9, 10, 14 and 19
new Claim 54	-Claim 9, 10, 14 and 19
new Claim 55	-Claims 14 and 18
new Claim 56	-Claim 8
new Claim 57	-Claim 7
new Claim 58	-page 32, line 10 -page 37, line 9 provides support for "cup-shaped"
new Claim 59	-Claim 15
new Claim 60	-Claim 16

new Claim 61	-Claim 10 "conductive liner" -page 27, lines 14-18 "Examples of conductive liners..." -Figures 4A-4C -page 32, line 10 -page 37, line 9
new Claim 62	-page 34, lines 20-21 -Figure 6R
new Claim 63	-page 34, lines 20-21 -Figure 6R
new Claim 64	-Claim 15
new Claim 65	-Claim 16

Comments:

Page 2 of Office Action dated February 24, 2004 (paper 0204) states:

*"On the other hand, the original elected claims disclose the product comprising an electrically contact having no open ends, no dielectric material formed over the interior surface of the cup-shaped contact, and no protrusion(s) extending upward from the rim of the cup-shaped contact."*

It is again respectfully noted that applicant in applicant's Response (dated 12/20/02) elected Group I: claims 1-21, 32-44.

Claim 8 as filed recites:

"The memory element of claim 1, wherein said conductive layer is a conductive liner".

Page 27, lines 14-18, of applicant's specification as filed, recites:

"Examples of conductive liners are shown in Figures 4A-4C. In Figure 4A, the conductive liner 430A is formed in a trench. Figure 4B, the conductive liner 430B formed in a rectangular via hole. Figure 4C is an example of a conductive liner 430C formed in a circular via hole."

Referring to Figures 4A-C, it is seen that all of the conductive liners 430A-C have open ends. Additional support for "open end" is found on page 28, lines 14-20. Conductive liners 430B and 430C are both cup-shaped. Additional, support for the language "cup-shaped" is found in page 32, line 10 and page 37, line 9 of the application as filed.

Support for "a second dielectric layer disposed on said conductive layer" (claim 50) and "a dielectric material disposed on the interior surface of said cup-shaped contact" (claim 61) is found in Figure 6D of the application as filed. The originally elected claims of Group I do not prohibit such a limitation. Support for "protrusion" (claim 61) is found on page 32, line 18 of the application as filed. Support for "rim" (claim 61) is found on page 29, line 7.

The references cited in the Office Action dated April 9, 2003 cites the following references:

- 1) Gonzalez (US 5,854,102)
- 2) Doan (US 6,423,621)
- 3) Ovshinsky (US 5,687,112)
- 4) Ovshinsky (US 5,414,271)

ANALYSIS OF CLAIM 50-60 WITH REGARD TO CITED REFERENCES:

New independent claim 50 recites:

50. (new) An electrically programmable memory element, comprising:

a first dielectric layer having an opening;

a conductive layer disposed on a sidewall surface of said opening;

a second dielectric layer disposed on said conductive layer within said opening,

said conductive layer including a first portion on said sidewall surface and a second portion on said sidewall surface, said second portion raised above the upper surface of said first portion; and

a programmable resistance memory material in electrical communication with said conductive layer.

Gonzalez (US 5,854,102)

Gonzalez (Fig. 8) discloses a memory element that includes plug 38 of polysilicon. Gonzalez fails to teach or suggest the limitations of applicant's claim 50. In particular, Gonzalez does not teach:

...a first dielectric layer having an opening;  
a conductive layer disposed on a sidewall surface of said opening;  
a second dielectric layer disposed on said conductive layer within said opening...

Doan (US 6,423,621)

Doan (Fig. 14) is directed to a method of forming a memory element wherein the lower electrode includes a tip (114) protruding toward the memory material. However, Doan fails to teach or suggest the limitations of applicant's claim 50. In particular, Doan does not teach:

...a first dielectric layer having an opening;  
a conductive layer disposed on a sidewall surface of said opening;  
a second dielectric layer disposed on said conductive layer within said opening...

Ovshinsky (US 5,687,112)

Ovshinsky '112 (Figs. 1 and 2) is directed to an electrical contact that tapers to a peak adjacent to a memory material. Ovshinsky '112 also fails to teach or suggest the limitations of applicant's claim 50. In particular, Doan does not teach:

...a first dielectric layer having an opening;

a conductive layer disposed on a sidewall surface of said opening;

a second dielectric layer disposed on said conductive layer within said opening...

Ovshinsky (5,414,271)

Ovshinsky '271 (Fig. 1) shows a cup-shaped conductive layer 32,34 having a open end facing away from substrate 16. However, Ovshinsky fails to teach or suggest the limitation ...a second dielectric layer disposed on said conductive layer within said opening..."

as claimed by applicant in claim 50.

In contrast, Ovshinsky '271 teaches a memory material 36 of chalcogenide deposited over the interior surface of cup-shaped structure formed by layer 32,24 (see column 16, line 42).

In view of the above remarks, each of the references Gonzalez, Doan, Ovshinsky '112 and Ovshinsky '271, either alone or in combination, fails to teach or suggest the limitations of applicant's new independent claim 50. Claims 51-60 depend from claim 50. Hence, the cited references fail to teach or suggest all of the limitations of any of the dependent claims.

ANALYSIS OF CLAIMS 61-65 WITH REGARDS TO CITED REFERENCES:

New claim 61 recites:

61. (new) An electrically programmable memory element, comprising:

a substrate;

a cup-shaped electrical contact electrically coupled to said substrate, said cup-shaped contact having an open-end facing away from said substrate, said contact including one or more protrusions extending upward from the rim of said cup-shaped contact;

a dielectric material formed over the interior surface of said cup-shaped contact; and

a programmable resistance material electrically coupled to at least one of said protrusions.

Gonzalez (US 5,854,102)

Gonzalez (Fig. 8) discloses a memory element that includes plug 38 of polysilicon. Gonzalez fails to teach or suggest a cup-shaped electrical contact as claims by applicant in claim 61.

Doan (US 6,423,621)

Doan (Fig. 14) is directed to a method of forming a memory element wherein the lower electrode includes a tip (114) protruding toward the memory material. However, Doan



fails to teach or suggest a cup-shaped electrical contact as claimed by applicant in claim 61.

Ovshinsky (US 5,687,112)

Ovshinsky '112 (Figs. 1 and 2) is directed to an electrical contact that tapers to a peak adjacent to a memory material. Ovshinsky '112 also fails to teach or suggest a cup-shaped electrical contact as claimed by applicant in claim 60.

Ovshinsky (5,414,271)

Ovshinsky '271 (Fig. 1) shows a cup-shaped conductive layer 32,34 having a open end facing away from substrate 16. However, Ovshinsky fails to teach or suggest the limitation "...a dielectric material disposed on the interior surface of said cup-shaped contact..." as claimed by applicant in claim 61.

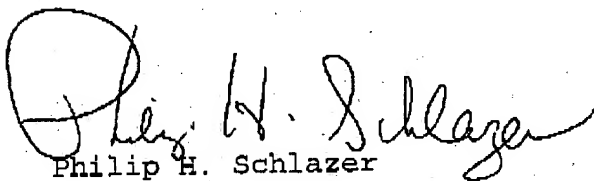
In contrast, Ovshinsky '271 teaches a memory material 36 of chalcogenide deposited over the interior surface of cup-shaped structure formed by layer 32,24 (see column 16, line 42).

In view of the above remarks, each of the references Gonzalez, Doan, Ovshinsky '112 and Ovshinsky '271, either alone or in combination, fails to teach or suggest the limitations of applicant's new independent claim 61. Claims 62-65 depend from claim 61. Hence, the cited references fail to teach or suggest all of the limitations of any of the dependent claims.

**SUMMARY**

Claims 1-49 have been cancelled and claims 50-65 have been added. Applicant respectfully requests reconsideration, withdrawal of the outstanding objections and rejections, and notifications of allowance. Should the Examiner have any questions or suggestions regarding the prosecution of this application, he is asked to contact applicant's representative at the telephone number listed below.

Respectfully submitted,



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